2-phase motor driver for VCR cylinder motors

BA6825FS/BA6826FS

The BA6825FS and BA6826FS are direct-drive motor drivers suitable for 2-phase, full-wave linear motors. They consist of a Hall amplifier control circuit and driver circuits.

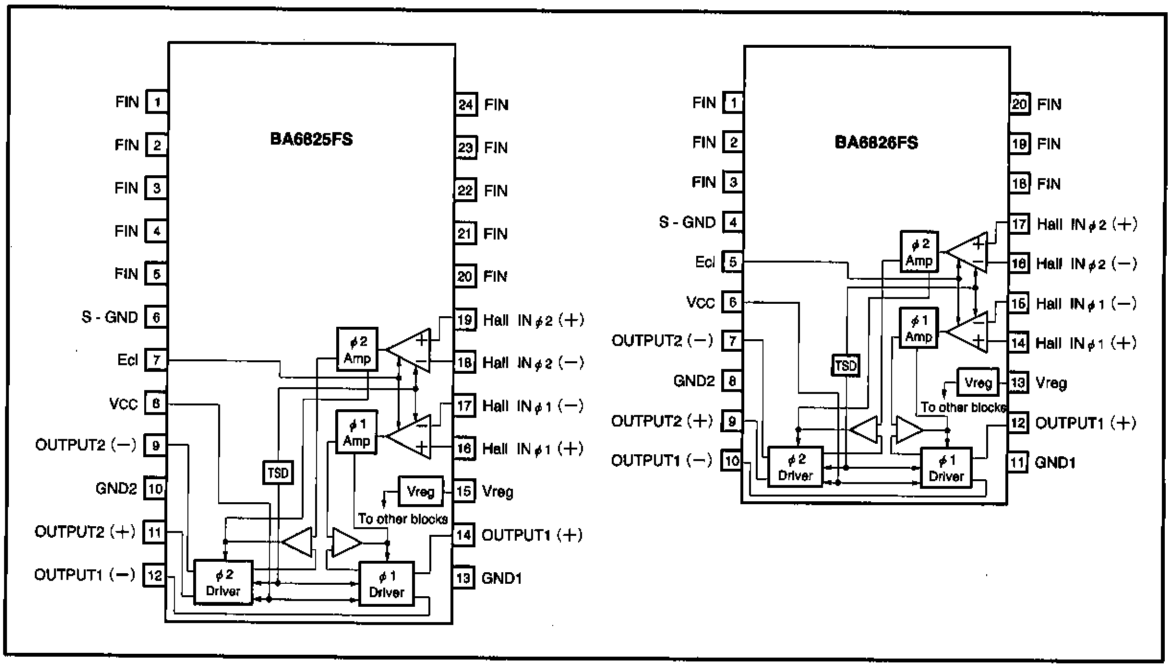
●Applications

VCR cylinder motors

●Features

1) Linear drive system provides low switching noise.
2) Constant supply voltage pin for Hall devices.
3) High ratio of output current against control current. (4000 typically)
4) Available in compact surface-mount packages.

●Block diagram



●Absolute maximum ratings (Ta=25℃)

Parameter		Symbol	Limits	Unit
Power supply voltage		Vcc	24	V
Power dissipation	BA6825FS	Pd	1200*1	mW
	BA6826FS		1000*2	
Operating temperature		Topr	−25~75	℃
Storage temperature		Tstg	−55~150	℃
Output current		$I_{OMax.}$	1200*3	mA
Input current		$I_{ECIMax.}$	5	mA

*1, *2 Mounted on a glass epoxy PCB (90 X 50 X 1.6 mm).
Reduce power by 9.6 mW for each degree above 25℃(BA6825FS).
Reduce power by 8.0 mW for each degree above 25℃(BA6826FS).
*3 Should not exceed Pd- or ASO value (for the current of one phase).

●Recommended operating conditions

Parameter	Symbol	Limits	Unit
Operating power supply voltage	Vcc	8.0~20.0	V

●Electrical characteristics (Unless otherwise noted, Ta=25℃, Vcc=12V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Circuit current	Icc	−	3.3	5.0	mA	
Constant output voltage	Vreg	4.6	5.0	5.4	V	
~MDA~						
Hall amplifier minimum input level	V_{INH}	50	−	−	mV_{P-P}	
Hall input bias current	I_{BH}	−	0.25	2.0	μA	I_{ECI}=100 μA
Output saturation voltage HIGH	V_{OH}	10.50	10.84	−	V	I_{OUT}=800mA
Output saturation voltage LOW	V_{OL}	−	1.27	2.1	V	I_{OUT}=800mA
~ECI (current control)~						
Ratio of pin-7 current against output current	I_{OUT}/I_{cont}	3000	4000	5000	−	Measured at ΔV_{IN} = 100 mV and I_{ECI} = 30 μA, 50 μA

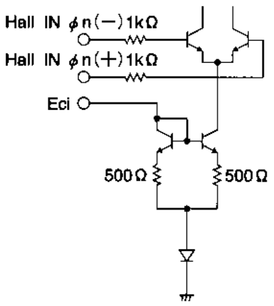
◎ Not designed for radiation resistance

●Pin description

Pin name	Function
S - GND	Signal ground pin
ECI	Output current control pin
Vcc	Power supply pin
OUTPUT2 (−)	Output pin
GND2	OUTPUT2 GND
OUTPUT2 (+)	Output pin
OUTPUT1 (−)	Output pin
GND1	OUTPUT1 GND
OUTPUT1 (+)	Output pin
Vreg	Constant voltage output pin
Hall IN ϕ_1 (+)	Hall signal input pin
Hall IN ϕ_1 (−)	Hall signal input pin
Hall IN ϕ_2 (−)	Hall signal input pin
Hall IN ϕ_2 (+)	Hall signal input pin
FIN	Radiation fin

●Input/output circuit

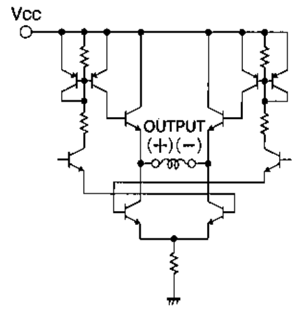
(1) Hall and E_{CI} inputs



(Resistances, in Ω, are typical values)

Fig.1

(2) Coil output



(Resistances, in Ω, are typical values)

Fig.2

●Circuit operation

1. The signal from the Hall device is amplified by the Hall amplifier and then supplied to the driver circuit. The driver gain, which is constant, is regulated by changing the Hall amplifier gain with the input current on the output current control pin (E_{CI} pin). The motor rotational speed is sensed by the FG, and the output of which is F/I-converted and supplied to the E_{CI} pin as a feedback signal, so that a constant rotational speed is maintained as follows :
   1) The motor speed decreases.
   2) The speed control IC outputs a feedback signal to the ECI pin.
   3) The Hall amplifier gain increases.
   4) The output current increases.
   5) The motor speed increases.

2. When the voltage on Hall IN ϕ_1 (+) is higher than the voltage on Hall IN ϕ_1 (−), an output current flows from OUT1 (−) to OUT1 (+) according to the voltage differential. When the voltage on Hall IN ϕ_1 (−) is higher, on the other hand, an output current flows from OUT1 (+) to OUT1 (−).
   Similarly, when the voltage on Hall IN ϕ_2 (+) is higher than the voltage on Hall IN ϕ_2 (−), an output current flows from OUT2 (−) to OUT2 (+) according to the voltage differential. When the voltage on Hall IN ϕ_2 (−) is higher, on the other hand, an output current flows from OUT2 (+) to OUT2 (−).

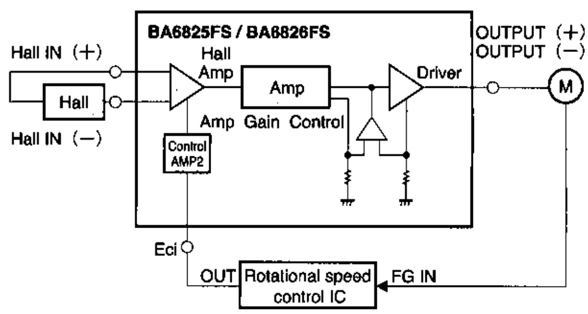


Fig.3

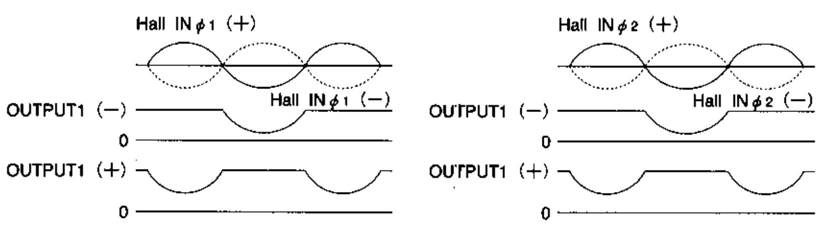


Fig.4

3. Output waveforms are shown in Fig. 5. Because of the amplifier offset, the output is left OPEN when the output signal switches from positive to negative. The output waveform is determined by the external circuit because the IC impedance increases during this transition period. Since inductive loads are usually provided, a capacitor should be connected to suppress the backlash voltage.

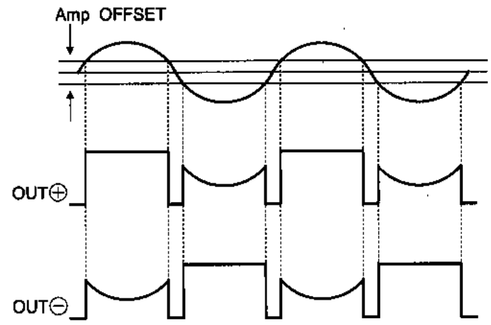
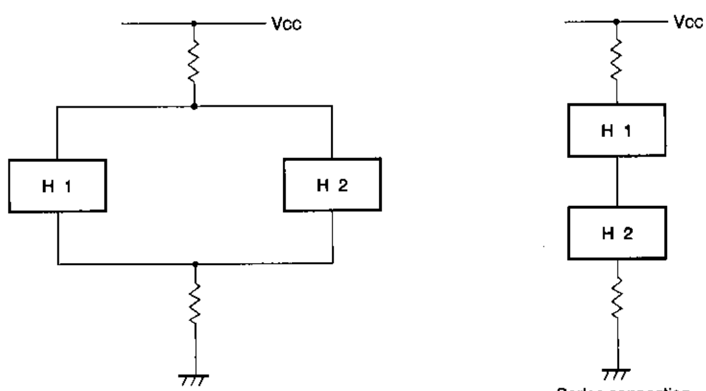


Fig.5

●Operation notes

1. E_{CI} input
   The ECI input circuit has $2V_F$ and a 500Ω resistor connected in series. Current is limited only by the 500Ω resistor.
2. Hall input
   Signals of 50mV (peak to peak) or greater should be applied to the Hall device input. The DC input range is between 2V and (Vreg−1.5V). There will be no problem if the input is centered around Vreg/2.

Because the Hall input impedance is 1MΩ or grater, any type of Hall device can be connected. No current flows when the transistor is off because the Hall input pins (+ and −) are differential.
Because the ICs are linear drivers, any DC offset in the Hall device will be amplified and appear in the output. Use Hall devices having a minimum offset. Hall devices can be connected in either series or parallel.



Parallel connection Series connection

Fig. 6

3. Thermal shutdown circuit
   The circuit puts the driver outputs (9, 11, 12, and 14 pin) to the open state at the temperature of 175℃ (typical). There is a temperature difference of about 20℃ between the temperatures at which the circuit is activated and deactivated.

●Example of application

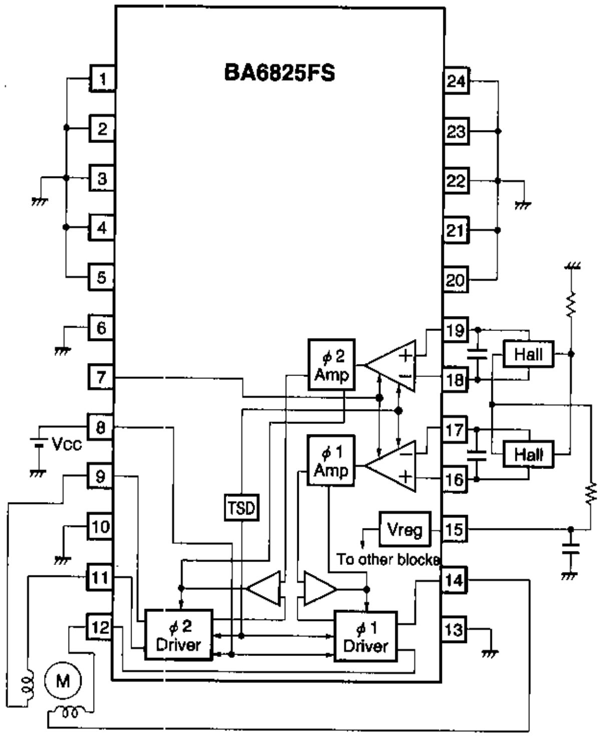


Fig.7 Application circuit of the BA6825FS

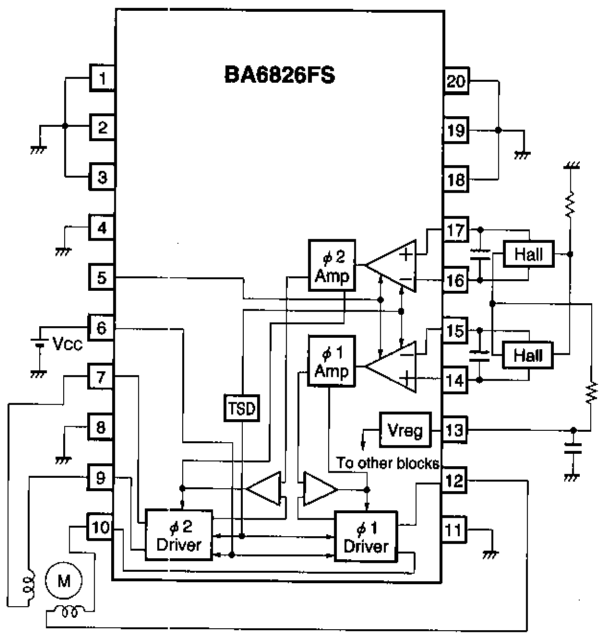


Fig.8 Application circuit of the BA6826FS

●Electrical characteristic curves

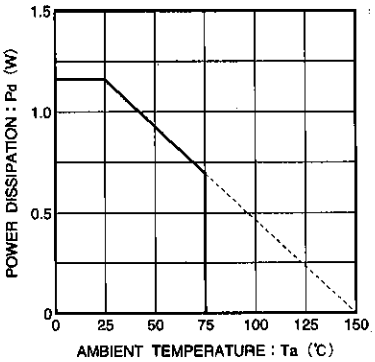


Fig.9 Power dissipation curve (BA6825FS)

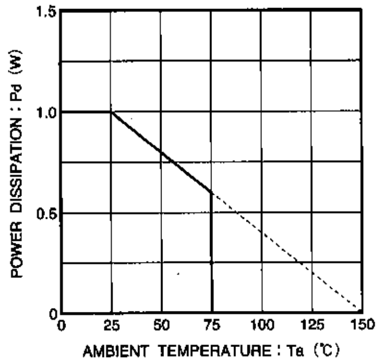


Fig.10 Power dissipation curve (BA6826FS)

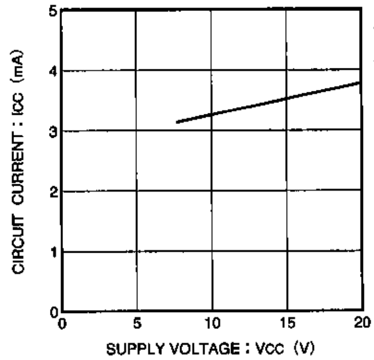


Fig.11 Circuit current vs. supply voltage

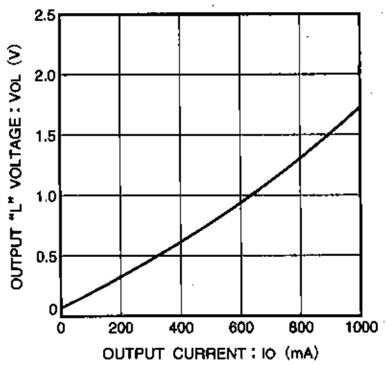


Fig.12 LOW level output voltage vs. output current

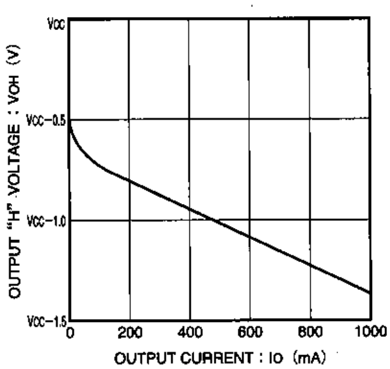
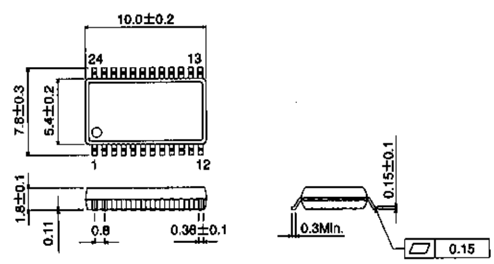


Fig.13 HIGH level output voltage vs. output current

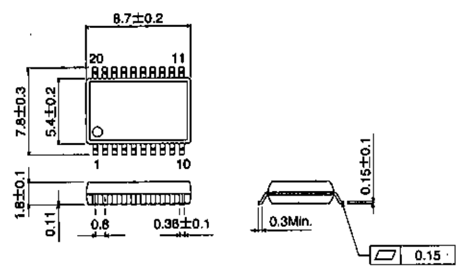
●External dimensions (Units: mm)

BA6825FS



SSOP - A24

BA6826FS



SSOP - A20